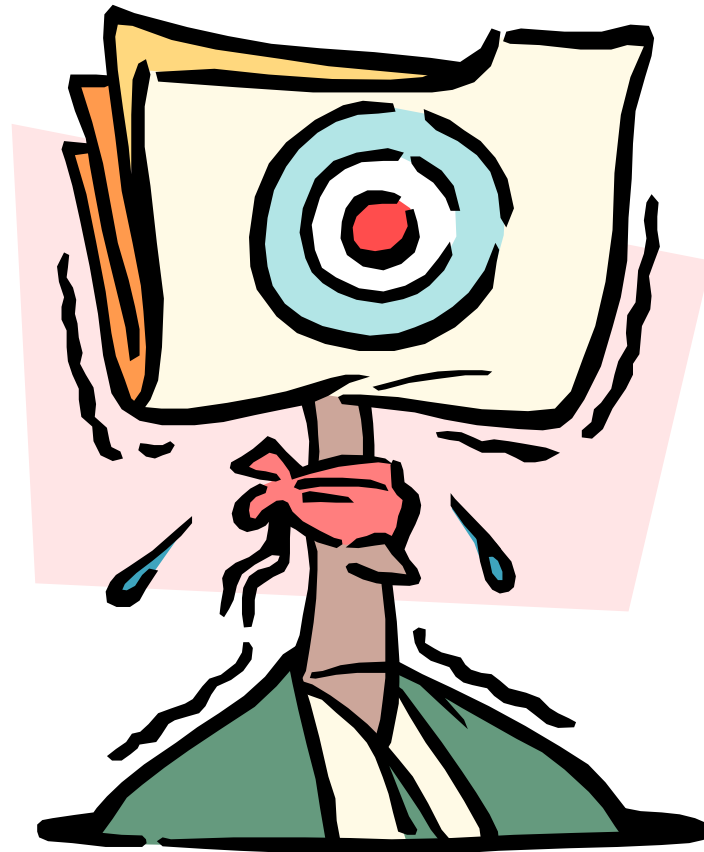


# **Safety & Aesthetics in Urban Roadway Design**



# Presentation Target

- ★ Discussion
- ★ Overview of Issue
- ★ WSDOT/City/County Groups
- ★ Participation
- ★ Feedback



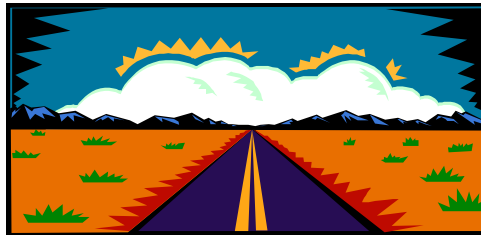
# What is Context Sensitive Design?



★ Pedestrians



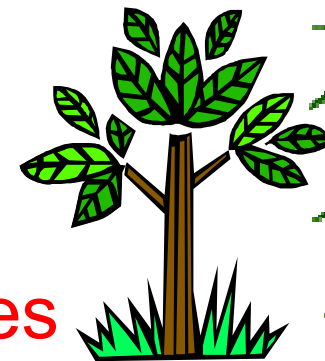
★ Aesthetics,  
Environment and  
Community  
Values



★ Mobility and Safety



★ Channelization  
and Access  
Control



★ Street Trees

# Optimization

- ★ Understanding the Elements of Design and the Tradeoffs Between Them
- ★ A Willingness to Work Towards a Solution That Maximizes the Benefits to All Parties Involved
- ★ Vision, Scope, Design, Construct



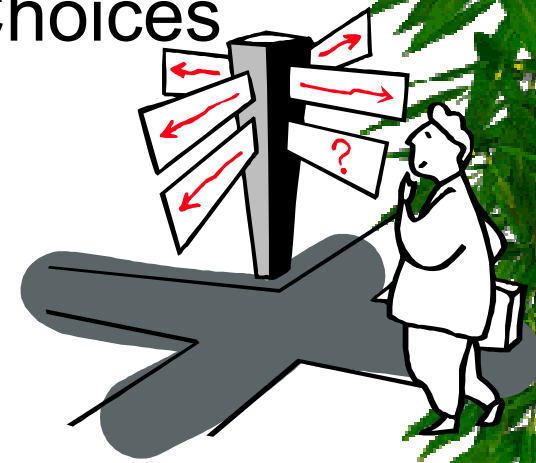
# Issues of Advocacy

- ✳ Community Viewscapes / Roadway Safety
- ✳ Traffic Capacity / Calming
- ✳ Pedestrians / Autos
- ✳ **State / Local Standards**
- ✳ Shoulder / Median Clear Zones
- ✳ Liability –Manage or Avoid?



# Issues of Philosophy

- ★ Substantive vs. Nominal Safety
  - Design Guidelines vs. Performance
- ★ Reality and Rhetoric
- ★ Flexibility to Make Professional Choices
  - Assume the Responsibility for Choices Made
- ★ Documentation of Decisions



# Issues of The Design Manual

- ★ Limited Access/Access Managed
- ★ NHS/Non-NHS
- ★ Roadway/Roadside
- ★ Design Manual/LAG/AASHTO
- ★ Approval Authority for Project/Approval Authority for Deviations
- ★ Region/Headquarters



# Resolution Path

- ✳ Safety & Aesthetics Interdisciplinary Group
- ✳ Community Partnership Forum
- ✳ Internal WSDOT Discussions
- ✳ In-Service Evaluations
- ✳ Local Agency Design Standards Committee
- ✳ Local Agency Guidelines Committee
- ✳ External Communications





# Players

- ★ AWC
- ★ PSRC
- ★ CRAB
- ★ FHWA
- ★ WSDOT Design
- ★ WSDOT H&LP
- ★ WSDOT Traffic
- ★ OTED
- ★ Pierce County
- ★ City of Seattle
- ★ City of Bremerton
- ★ City of Spokane

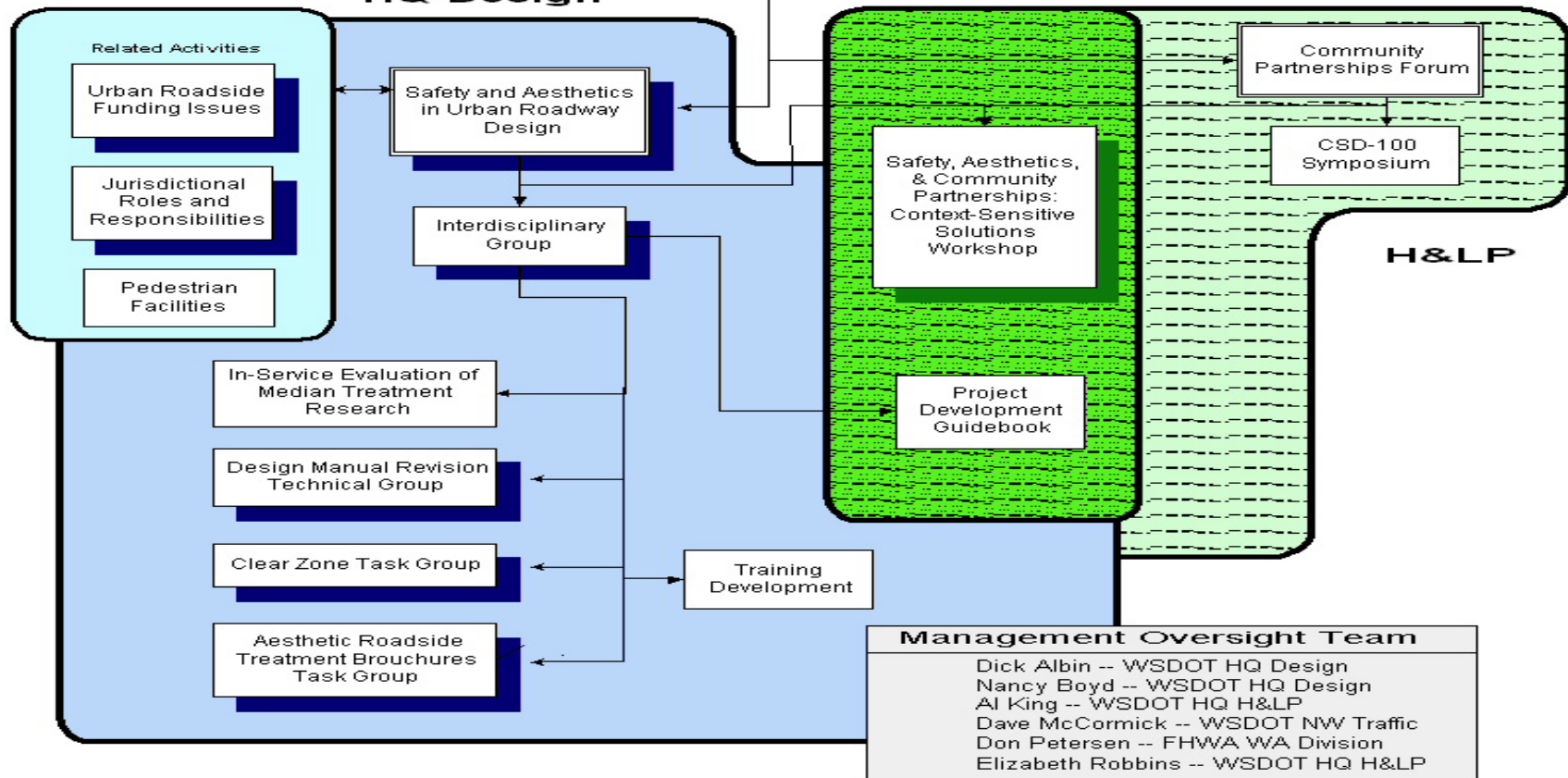


# Project Overview

## Safety, Aesthetics, and Community Partnerships

Nancy Boyd, WSDOT HQ Design, Project Manager

### HQ Design



# **Safety & Aesthetics / Urban Design**

- ★ Interdisciplinary Group
- ★ Median Treatment Brochures
- ★ Pedestrian Accident Locations
- ★ Design Manual Revisions
- ★ Interdisciplinary Group
- ★ Training
- ★ Clear Zone Task Group Design Manual Revisions
- ★ Jurisdictional Responsibilities

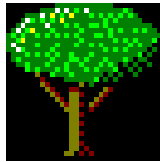


# Urban Clear Zone

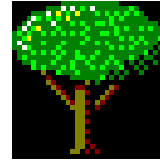
A Case Study in Design Policy  
Development



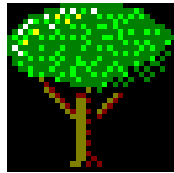
# Crash Test and Simulations



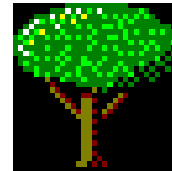
small car into pole



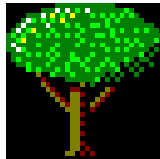
truck into pole



berm



steep berm



wall test



wall sim



# WSDOT Policy Development

- ★ Sources of information include national guidance (such as FHWA and AASHTO), and research (internal, other states or universities, national)
- ★ Implementation into the WSDOT Design Manual is reviewed by HQ Design and a draft is prepared. This draft is submitted for a statewide review and then to FHWA for approval.



# **WSDOT Policy Development**

- ★ The WSDOT Design Manual and the City/County Standards are the basis for our agreement with FHWA on how we will design our facilities
- ★ While AASHTO is not a policy or standard, we need good reasons for developing policy that is different .



# WSDOT Policy Development

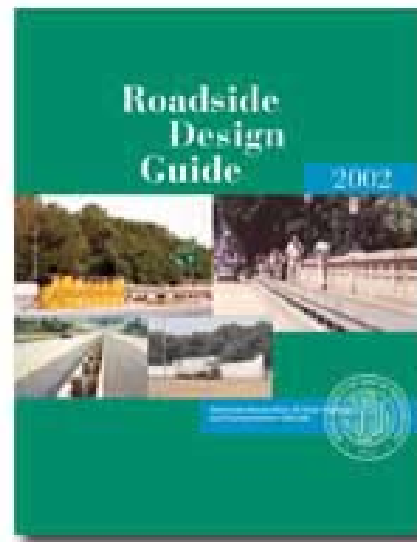
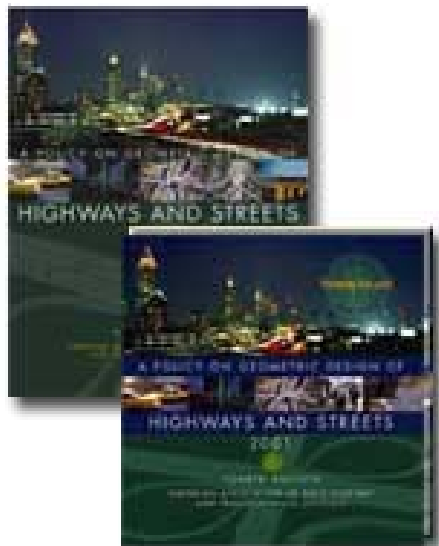
- ✱ Used to be Headquarters Decides and Offers Review and Comment
- ✱ Affected Players are Brought in Early In Policy Development
  - Clear Zone Changes are Being Discussed with Cities Prior to External Review





# Guidance and Policy Review

- ★ AASHTO “Green Book”
- ★ AASHTO Roadside Design Guide
- ★ WSDOT Design Manual
- ★ City/County Design Standards



# **1990 AASHTO Green Book**

## **(page 343-4)**

- ★ For urban arterials, collectors and local streets where curbs are utilized, space for clear zones is generally restricted.
- ★ A minimum distance of 1.5 feet should be provided beyond the face of curb with wider clear zones provided where possible.
- ★ Where shoulders are provided rather than curbs, a clear zone commensurate with rural conditions should be provided.



# **2001 AASHTO Green Book**

## **(page 322-3)**

- ★ For urban arterials, collectors and local streets where curbs are utilized, space for clear zones is generally restricted.
- ★ A minimum offset distance of 18 in should be provided beyond the face of curb with wider clear zones provided where practical.
- ★ This “operational” offset will generally permit curbside parking and will not have a negative impact on traffic flow.



## **2001 AASHTO Green Book (page 322-3) – continued**

- ★ However, since most curbs do not have a significant capability to redirect vehicles, a minimum clear zone distance commensurate with prevailing traffic volumes and vehicle speeds should be provided where practical.



# **1996 AASHTO Roadside Design Guide (Page 3-16)**

- ✳ In urban conditions, a minimum horizontal clearance of 0.5 m should be provided beyond the face of curb



# **2001 AASHTO Roadside Design Guide (Page 3-12)**

- ★ When obstructions exist behind curbs, a minimum horizontal clearance of 1.5 ft should be provided beyond the face of curb to the obstruction.
- ★ This offset may be considered the minimum allowable horizontal clearance (or operational offset), but it should not be construed as an acceptable clear zone distance.



# **2001 AASHTO Roadside Design Guide (Page 3-12) continued**

- ★ Since curbs do not have significant redirection capability, obstructions behind a curb should be located at or beyond the minimum clear zone distances...
- ★ In most instances this will not be feasible to obtain the recommended clear zone distances on existing facilities.



# **2001 AASHTO Roadside Design Guide (Page 10-2)**

- ★ While the clear roadside concept is still the goal of the designer, there are likely to be many compromises in the urban or suburban area
- ★ On misconception is that a curb with a 1.5 ft offset behind it satisfies the clear roadside concept.
- ★ Realistically, curbs have limited redirection capabilities and only at low speeds, approximately 25 mph or lower.





## **2001 AASHTO Roadside Design Guide (Page 10-2) continued**

- ★ Consequently, regardless of curbing, the designer must strive for a wider clear zone that is more reflective of the off-peak operating speed (85<sup>th</sup> percentile) or design speed whichever is higher.



# **WSDOT Design Manual**

## **(page 700-2)**

- ★ The Clear zone is a primary consideration when analyzing hazards.
- ★ The intent is to provide as much clear, traversable recovery area as practical.
- ★ The Design Clear Zone values shown in Figure 700-1 are used to judge the adequacy of the existing clear zone and to provide a minimum target value for highway design.



# **WSDOT Design Manual (page 700-2)**

- ★ These values are not to be used as justification to compromise or take away from the existing clear zone.



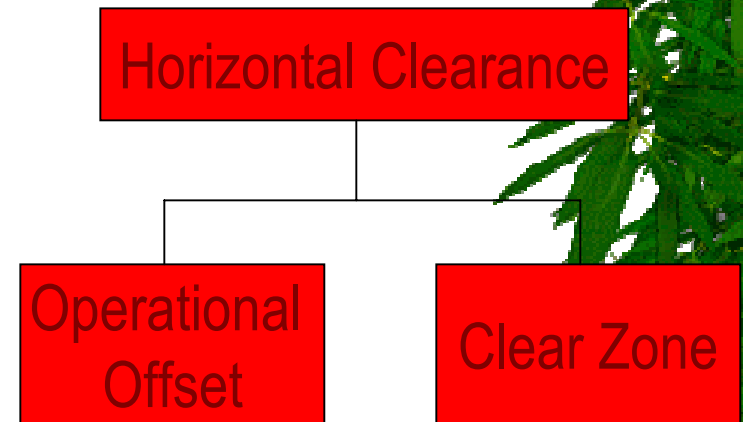
# City/County Design Standards (Page 9)

- ✱ Refers to AASHTO or TRB Special Report 214



# Review previous meeting discussions

- ★ The 2001 AASHTO Green Book and Roadside Design Guide continue to acknowledge the restricted environment in urban areas. However, the changes clarified the intent of the “operational offset” and avoided the reference to this offset as a clear zone. It also encourages providing wider clear zones where practical.



# Strategy/Action:

The following is the strategy that the group agreed would be acceptable:

- ★ The WSDOT should clarify the clear zone policy.
- ★ The policy should resemble that language in AASHTO Roadside Design Guide
- ★ The policy would focus on facilities with posted speeds of 35 mph or less



# Strategy/Action: (continued)

- ★ This would require the clear zone to be established and justified on a project by project basis or functional use basis rather than an relying on an operational offset.
- ★ The clear zone distances on Design Manual figure 700-1 should be revised to be consistent with AASHTO Table 3.1
- ★ Clarification of issues such as parking, curbing and the appropriate location to begin measuring the clear zone (edge of traveled way) should be included.



# Strategy/Action: (continued)

- ★ The policy should clarify the distinction between evaluating an existing clear zone and adding new objects
- ★ A draft Design Manual Supplement will be sent out to the task Group for review. It will then be sent out for a statewide review and then to FHWA for approval.
- ★ The Task group agreed to this approach but it was recognized that agencies that were not in attendance may need some explanations when it is sent out for review.





# What's Next?

Helping designers implement  
solutions in the urban  
environment

- ★ WSDOT Design Guidance
- ★ Urban Design companion  
booklet



# Overview of direction of Design Manual Supplement

- ★ Recognize that there needs to be some flexibility in the establishment of clear zones in urban areas
- ★ Allows the clear zone to be established based on a corridor or project analysis for urban streets with posted speeds of 35 mph or less



# Elements proposed for change in the WSDOT *Design Manual*

- ★ Based on input from local agency participants in the “Safety and Aesthetics in Urban Roadway Design” Interdisciplinary Group
- ★ Arterial HOV lanes: Should HOV lanes be considered part of clear zone depending on operational characteristics during off-peak periods
- ★ Shoulder Offsets widths: Should the minimum shoulder width be reduced from 4' to 3'. What are the impacts to bike, pedestrian and vehicle traffic.



Planning link to design policy	Consideration of design policy during planning phase of project development	120	Nancy
In-service performance process	Add in-service process	Div. 3	Nancy
Approval authority	Add local agencies to the approval process	Ch. 330	Dick
Land use discussion	Define urban/suburban	330 and/or 440	Dave
Geometric Design Criteria	Organize by access management class; figures 440-5 and 440-6; cross section, speed, land use	440	Ted
	Cross section elements in urban areas	Figure 440-5 and 640	Ted
Speed limits, etc.	Discuss distinction between posted speed, operating speed, design speed, etc.; clarify applications for design elements	440	Ted
Land use transition treatments	Land use transition treatments (application of roundabouts and other tools); urban centers within	620*	Ted
Snow storage	Where/how snow storage should be addressed	640	Nancy
Clear zone	Add supplement info	700	Dick
Potential roadside obstacles	Specific to urban areas, discuss introduction and mitigation of hazards; discuss differences of hazards at different speeds	700.05	Doug
Modifications based on new MUTCD criteria	Ongoing assessment based on changes (over a year away)	Div. 8	Larry/Mike Dornfeld
Signing	City needs; sign structures, sign mounting	820, Std. Plans	Larry
Pavement markings	City needs	830, Std. Plans	Larry
Street illumination	Develop criteria for city environments; more emphasis on pedestrian lighting; median lighting	840	Larry
Intersection sight distance	Stopping point at intersections; relation of stop bar to sight distance; object height	910	Ted/Larry
Driveways and commercial approaches		920	Larry/Ted
Left-turn channelization	Storage lengths in urban areas; design vehicles for double lefts	950	Ted/Larry
Bicycle considerations	Bicycle stop bar locations, distinctions based on land use	1020	Larry



# Contacts for Safety and Aesthetics

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- [boydn@wsdot.wa.gov](mailto:boydn@wsdot.wa.gov)

- ★ John Milton

- [miltonj@wsdot.wa.gov](mailto:miltonj@wsdot.wa.gov)

- ★ Website

- `http://www.wsdot.wa.gov/eesc/design/Urban/Default.htm`

